Australian
Bureau of
Statistics

CENSUS OF 30 JUNE 1986
SEX DIFFERENCES IN OCCUPATIONAL ATTAINMENT

Catalogue No. 6283.0

OCCASIONAL PAPER

CENSUS 86 - SEX DIFFERENCES IN OCCUPATIONAL ATTAINMENT

Dr Graeme Vaughan
Australian Bureau of Statistics

CONTENTS

PREFACE

This occasional paper was written by Dr Graeme Vaughan, Australian Bureau of Statistics. It is based on a detailed analysis of 1986 Population Census data undertaken when Dr Vaughan was a Research Statistician at the ABS.

The ABS objectives for the Research Statistician Scheme are to encourage the greater use of ABS data in academic and other research, to encourage the development of new analytical techniques for the analysis of data and to increase the general level of research into problems relevant to the ABS.

The conclusions drawn and observations made by Dr Vaughan are his own, and do not necessarily represent the views of the Australian Bureau of Statistics.

Any detailed enquiries about his analysis should be directed to Dr Vaughan (06-252 7030). Any requests for data from the 1986 Census, the 1991 Census, or other ABS statistics should be directed to Ms Suzanne Droop, Information Services Branch (06 252 6295).

RICHARD MADDEN
Acting Australian Statistician

ACKNOWLEDGEMENTS

SUMMARY

This study investigates factors affecting skill level occupational attainment of women compared to men using 1986 Census data. Explanations for occupational attainment can be divided into those which allege that occupation is the outcome of achieved characteristics (education and labour market experience, for example) and those which hold that it is strongly influenced by ascribed characteristics such as gender.

This study explores the application of hypotheses derived from status attainment and human capital theories (achieved characteristics) and discrimination, divided labour market theory, and the ideology of gender (ascribed characteristics) to the question of gender differences in skill level occupational attainment. It concludes that gender differences in occupational attainment are significant and are the product of sex differences in labour market endowments, as predicted by the theory of status attainment.

NOTE

This paper is part of a study exploring sex and birthplace differences in occupational attainment, which investigated factors affecting skill level occupational attainmment of women compared to men and overseas born groups compared to the Australian born. The study concluded that occupational attainment differences between males and females may be explained in somewhat different terms than those used to account for occupational differences between the Australian and the overseas born. The differences between men and women in occupational attainment, considered in terms of the broad skill levels of the ASCO classification, is the result of male-female differences in education and labour market experience. The differences between the Australian born and the overseas born groups is not simply the product of inter-group differences in labour market endowments. Indeed, inter-group differences in labour market endowments somewhat hide the differences in occupational attainment between the overseas and Australian born. With the exception of the Asian born, differences between the overseas and Australian born are mainly the product of the non-transferability of education and labour market experience from the overseas to the Australian context.

Because it was found that differences in occupational attainment for women and migrants, compared to men and the Australian born, arise from different causes, the study is published in two parts, *Sex Differences in Occupational Attainment* (6283.0) and *Birthplace Differences in Occupational Attainment* (6282.0). Both studies start from the same perspective, focusing on the question of what factors affect the relative occupational distributions of different groups in the Australian community. Both papers also use similar theoretical tools and analysis for the investigations.

1. INTRODUCTION

This paper focuses on the question of what factors affect the relative occupational distribution of men relative to that of women in Australia. Two broad categories of explanation for such differences may be distinguished: the first based on acquired or achieved characteristics relevant to job performance and the second on ascribed characteristics not directly related to job performance.

In the first category of explanations are located the two traditions which dominate much current research in sociology and economics - status attainment and human capital theory, respectively. In sociology, status attainment research focuses on the link between socio-economic background and achieved characteristics, such as education, and occupational attainment (See, for example, Broom and Jones 1976). Similarly, the human capital theorists argue that people act as rational individuals who attempt to maximize their lifetime incomes, by making optimal decisions regarding time spent in education and training, and choice of occupation (Becker, 1975; Granovetter, 1981; Lloyd and Niemi 1979). If it is assumed that approximately free market conditions prevail in the labour market, then occupational attainment will be meritocratic, based on the possession of skills and knowledge relevant to job performance, in particular education, training, job skills and experience. The implication of these theories is not that there will be no differences in occupational distribution between groups defined by sex, but that such differences as do occur will reflect only group differences in factors relevant for job performance. In contrast, explanations based on the notion of ascription propose that factors extraneous to job performance constrain occupational attainment in a systematic and consistent manner. Consequently, certain groups in the community, such as women, are forced into occupations where incomes are low, work conditions poor and often unregulated, promotion opportunities few and unemployment a recurrent feature. Indeed, it has been argued that women, migrants and blacks form the core of a secondary labour market in Australia, as elsewhere (See, for example, Manderson and Inglis 1984, Gilmour and Lansbury 1978, Vaughan 1992). The explanations as to how this segmentation developed and is maintained are generally couched in terms of social discrimination, more general theories of social stratification, or the relatively independent effect of patriarchy.

Social prejudice against women may lead to systematic discrimination against them either by employers, who resist hiring women, or employees, who resist working with them, or both. There is substantial evidence that the belief systems justifying discriminatory practices are evident in Australia. Such discrimination, reinforced by belief systems justifying such action, channel women into the secondary labour market where income is low, work conditions are poor and jobs insecure (Doeringer and Piore 1971; O'Malley 1978; Wild 1974). This discrimination and its supporting belief systems are seen as important, but subsumable, mechanisms by the remaining two forms of explanation.

Other explanations see occupational inequality in terms of more general theories such as Marxist class theory. In Marxist class terms, Collins (1975, 1978, 1984) and O'Donnell (1984), for example, argue that groups, such as women, function as an industrial reserve army to keep wages and labour costs down and as a buffer against unemployment for Australian born men, thus segmenting the working class and preventing the development of class consciousness. Thus the segmentation of the labour market is seen to result from the working out of the interests of the capitalist class, concerned to reduce labour costs and to prevent structurally threatening political action by the working class, and the interests of the "labour aristocracy" who consequently enjoy higher wages, better working conditions and job security relative to those confined to the secondary labour market.

On the other hand, Lever-Tracy(1981) argues for the ethnic and gender segmentation of the working class but against the notion of a dual labour market. According to her analysis, the labour market is segmented into six key categories, divided by both ethnicity and gender: Australian and Northern European born men, Southern European born men, Aboriginal Australian men and the corresponding groups of women. She argues that the jobs undertaken by migrants in particular are primary, not secondary, to the interests of capital, and hence that the notion of a dual labour market does not fit the Australian experience (see also Bottomley 1988).

Whereas discrimination accounts for occupational inequality in terms of the social beliefs and behaviours of those with power to control employment, and whereas class theory accounts for inequality in terms of class power relations, explanations based on the independent dynamics of patriarchy account for inequality, at least in part, in terms of power relations structured by the distinction between women and men. Such explanations propose that occupational inequality does not merely result from prevailing discriminatory beliefs and actions, but rather that such discriminatory beliefs and actions support prevailing inequalities of power based on gender. They also propose that class alone is insufficient to account for occupational inequality, and that it is necessary to understand the relationship between class and gender in order to account for inequality (see, for example, Eisenstein 1979: 5-6; Western 1983: 132-136). The core of such explanations, for the purpose of this study, is that occupational inequality is part of a larger process of structural inequalities between social groups defined by gender.

In characterizing the different approaches to explaining occupational inequality, I have largely, and quite deliberately, glossed over the very real differences in the range of theoretical positions covered both within and among the types. For the purpose of this analysis, the main distinction is the very broad one between explanations which see occupational inequality as the outcome of achieved characteristics and those which are based on ascriptive factors. Explanations based on the

assumption of a competitive labour market imply that group differences in occupational attainment will be insignificant once the factors relevant to job performance are considered. On the other hand, the various explanations which assume that occupational attainment is, at least in part, a product of ascription, lead to different empirical implications: that group differences will remain important even when these factors are taken into account, and/or that additional factors relevant to the nature of the group will need to be considered.

In the case of discrimination, which cannot be measured directly, its presence may be inferred by the residual effect of the characterising variable (in this case, sex) after factors likely to affect occupational attainment have been considered. A note of caution is warranted because it is not possible to identify or measure all factors which may reasonably be expected to influence occupational attainment. Indeed, a number of possible factors which could not be measured in this study are identified below. Discrimination may also be inferred from the way in which extraneous factors affect occupational attainment; if discrimination against a group is systematic then relevant labour market characteristics may be less important than extraneous factors.

In the case of explanations which subsume gender occupational inequalities in broader social processes, the empirical implications are less clear cut. Nevertheless, they imply that sex inequalities in occupation are likely to be accounted for by factors relating to class, status and power positions. While factors relevant to class and status (for example, standard of living, parental occupation and education) are obtainable, they were not available for this analysis due to the nature of the data source. An exception to this is the education variable, which is also a factor relevant to job performance. Hence the interpretation of results in terms of these types of explanations is likely to be difficult.

The implications of explanations based on gender itself as being of major importance are not as clear cut as they might first appear. While a result which demonstrated that no factors other than sex were important would provide powerful evidence for these explanations, its absence does not necessarily refute them. Rather it could suggest that the effect of patriarchy on occupational attainment was mediated by other social inequalities. Such an impression would be strengthened if these other factors were not job related, but rather characteristic of women.

Hence certain empirical questions arise from this consideration of the types of explanations which have been put forward to account for inequalities in occupation. To what extent are differences in the occupational distribution of gender based groups the result of:

(a) the independent effect of sex on the occupational distribution;

(b) differences between the sexes in factors relevant to occupational attainment (e.g. education and labour market experience);

(c) differences between the groups in other factors (e.g marital status, number of dependent children);

(d) residual, unmeasured factors?

2. Advantages and limitations

The nature of this analysis offers certain unique advantages compared to previous studies, but also carries with it its own set of limitations. First of all, this study brings unique data to bear on the question of occupational attainment. Whereas previous research used the one percent Census sample or sample surveys such as the ANU 1973 mobility study, the data used here has been extracted from the entire unit record data file of the 1986 Census of Population and Housing conducted by the Australian Bureau of Statistics. This data source is not publicly available for multivariate analysis and is more extensive than publicly available data such as the one percent public use Census sample and frequency and cross-tabulated tables generated from the 1986 Census and Labour Household Surveys. However, the size of the data file has created some practical and statistical difficulties, which are discussed below.

Second, the data are more recent than previous studies which were conducted using data collected from 1970 to 1981, which can tell us nothing about the current position of women in the occupational structure. This issue remains of current concern. While the labour force participation of women has increased considerably since World War II, differences between the occupational distributions of men and women have persisted with little overall change. There have been few Australian studies which have investigated the causes of these differences (for summary, see Eccles 1982); it remains an important but under-researched area.

Third, this analysis improves on previous work by using a better measurement of the dependent variable, occupation. The new Australian Bureau of Statistics' classification of occupations, the Australian Standard Classification of Occupations (ASCO) (see Appendix A), offers a number of improvements over previous classifications, such as the Census and Classified List of Occupations (CCLO) and derived scales such as the ANU2 scale of occupational status. Unlike CCLO, ASCO is based on a clear set of criteria derived from the principle that occupations are defined by the type of work, the set of primary tasks common to particular jobs. These criteria are designed to measure the skill required to perform primary occupation tasks. ASCO represents a considerable improvement over CCLO, in that it is based on more relevant criteria and adheres more closely to the time honoured classification principles of mutually exclusive groups and consistent application of identifiable criteria. It also improves on CCLO in a practical way, in that the construction of data relies on a rule based method of coding which ensures a greater consistency and accuracy of coding (McDonnell et al. 1978; Starrs and Vaughan 1988a, 1988b; Vaughan and Starrs 1987; Walker 1987).

It is important to note that ASCO ranks occupations (at the Major Group level only) in terms of differences in

skill level rather than in terms of status differences. This enables the occupational structure to be investigated from a different perspective than that used by studies which rank occupation by status. This study should be considered complementary to those which focus on the question of occupational status.

Fourth, the use of Census data permits the construction of a wide range of relevant measures of labour market endowments (education and labour market experience) and socio-economic factors (marital status, dependency of children and so on). In particular, the construction of a measure of women's labour market experience, which discounts for the effect of childbirth, enables this study to investigate the factors affecting women's occupational attainment in terms which allow comparison with the factors affecting men's occupational attainment. However, the nature of the data source also means that there are inherent limitations of the type of measures which can be extracted (see Appendix A).

Limitations on this study stem from the fact that it is secondary analysis of data collected for other, more general, purposes, cost and processing restraints arising from the large size of the data sets, and the nature of the explanatory model.

Certain consequences flow from the fact that this is secondary analysis and hence the analysis can only use available variables or those constructed from available variables. The measurement of some variables could be improved for the purposes of this study (see Appendix B). The variable, labour market experience illustrates many of these limitations. Because labour market experience is not measured directly the Census, it must be constructed from other variables. These other variables (years of education and years out of the labour force for child bearing and family responsibilities) are themselves somewhat arbitrary. The measure also cannot take account of time spent in vocational training or in the present occupation, since the Census does not collect data on these factors. Hence the measure of labour market experience used here must be considered as a measure of potential, rather than actual, time in the labour market.

As expected with secondary analysis, data are not collected on important factors. In particular, the following factors are not measurable: family background factors (standard of living, parental occupation and education), previous work history (especially, first occupation), personal characteristics relevant to occupational attainment (job preferences, non-certifiable skills such as sociability, motivation, leadership, knowledge of the job market, job search skills, manual dexterity, analytical reasoning and so on). Hence, these factors need to be considered when explaining residual effects.

The large size of the data file (approximately 6.5 million records in the extracted file) influenced the analytical strategy. The choice of logistic regression for the multivariate statistical analysis was made partly on the grounds that it had the capacity to handle large data files efficiently, through the use of weighted data. The costs of

dealing with such a large data set also meant that passes through the data had to kept to a minimum and to some extent influenced the need to develop a parsimonious model early in the data analysis process. Hence, for example, some obvious variables were excluded from the analysis on the grounds of cost and processing difficulties. For example, locality has been excluded because the hierarchical nature of the file structure for Census data meant that extracting this one item would prove difficult and costly.

While the model developed here sits firmly within the mainstream of sociological research, it is limited in that it considers only what may be termed the supply side of the labour market equation (Brown et al. 1980). The model examines the occupational distribution of women as the outcome of the distribution of the individual attributes of the group as a whole. It takes virtually no account of the demand side of the equation; it does not consider factors such as labour market conditions at the time of first employment and the demand for particular types of workers in particular settings. The model also takes no account of the process by which available workers are selected for occupations (see Granovetter 1981; Sorenson and Kalleberg 1981).

However, within these limitations, the analysis offers the prospect of shedding further light on the question of what influences the occupational distribution of men relative to that of women, a question which, although important, has not been subject to extensive research of late.

3. Occupation

Occupation is measured by the Major Group level of the Australian Standard Classification of Occupations (ASCO), used by the Australian Bureau of Statistics in the 1986 Census. ASCO is a skill-based classification which groups occupations according to their similarity in terms of the level and specialisation of skill required to perform tasks regarded as primary to the occupations. Conceptually, skill level is defined as the range and complexity of tasks; in practice it is measured by the amount of formal education, on-the-job training and previous work experience required to perform the primary tasks satisfactorily. The skill specialisation of an occupation is measured in terms of one or more of four variables: the field of knowledge required, the tools and equipment used, the materials worked on and the goods or services produced (Australian Bureau of Statistics 1986; Starrs and Vaughan 1988a, 1988b; Vaughan and Starrs 1987).

ASCO is different from its predecessor and most other occupational classifications in that it does not employ cross-cutting principles in aggregating occupations to groups. The formation of groups is determined by the criteria of skill level and specialisation and does not employ additional confounding criteria such as industry, occupational prestige or status, relationship to the means of production, distribution and exchange, or degree of control. In this sense, ASCO is not based on the relational content of jobs, but rather on the technical division of labour as considered by Griffin and Kalleberg (1981: 5):

Theoretically, occupations are positions in a technical division of labour which perform similar tasks and which have similar training and skill requirements.

However, it is important to note that ASCO uses generally accepted assessments of the skills required in terms of recognized qualifications, training and/or work experience needed for satisfactory performance of tasks. In practice, job entry requirements were often used as an indication of formal education and labour market experience. The equation between generally accepted skill requirements for an occupation and the actual technical requirements of the particular tasks primary to that occupation may not be one of equality. The formal and informal requirements for an occupation may come to exceed the actual level of technical competence, as a result, for example, of the combined effect of technological change reducing the level of expertise needed on the one hand, and occupational groups being able to maintain control over occupational entry requirements on the other (Bennett 1984; Cockburn 1983; Griffin 1983; Walker 1981). Employers may also require qualifications certifying a level of skill beyond that technically required, because this may enhance the status of the occupation and thus increase its desirability, or qualifications may be seen as reliable evidence of work related attitudes and abilities (for example, general intelligence, diligence, capacity to meet deadlines) (Walker 1987).

It is also clear that some occupational groups, particularly some professions and trades, utilize their position in the production process and other sources of power to regulate entry into the occupation. This often involves government regulation and occupational associations formally requiring certain credentials and may include licensing and registration. This control over entry requirements acts to protect and enhance the income and working conditions of the occupational group (Curtain 1987; Walker 1987). On the other hand, groups which lack sufficient sources of power may fail to be recognized as skilled (Walker 1987; Bennett 1984).

In short, the determination of skills required for satisfactory performance of jobs is socially and politically constructed; it represents the outcome of political and industrial bargaining, the capacity of groups to control entry into particular occupations, and prevailing conceptions of skill. As Richard Curtain puts it,

> While some jobs can be generally regarded as skilled or unskilled on the basis of technical competence, other factors to do with strategic position in the production process, the socially accepted view of an occupation (which is often maintained and reinforced by organized representatives of that occupation) and employers' use of qualifications as a general screening device also contribute to what is commonly meant by skill. Skill formation is not merely a technical process which can be related to the length of training (1987: 11).

While there is evidence which indicates that there are disparities between the technical requirements of certain occupations and the labour market requirements, no assessment of the overall extent and pattern of this relationship has been attempted. There are, however, some indications that women, in particular, are disadvantaged by the social and political construction of skill (Curtain 1987; Walker 1987).

4. The occupational distribution

The differences between the occupational distribution of women compared to men have proved to be pronounced and persistent. Women's employment has been characterized as both highly concentrated and segregated. Occupational concentration is defined as the extent to which the workforce group is distributed across occupations as O'Donnell (1984:17) noted, prior to the 1986 Census:

> Eighty-four per cent of women workers ...are concentrated in 18 of the 61 occupations listed by the government statistician. Over half of the female workforce is concentrated in the five occupations of clerical worker, sales assistant, stenographer/typist, housekeeper/cook/maid or teacher.

Not only have women been concentrated in relatively few occupations, but this concentration has largely been in occupations where they form the majority sex. Hence, the Australian occupation structure has been characterized by a marked degree of segregation by sex. Despite differences in the means used to measure the extent of occupational segregation and the different time periods used to make comparisons, it would appear clear that there is a persistent difference between the occupational distribution of women compared to that of men (Broom and Jones 1976; Eccles 1982; Karmel and Maclachlan 1988; Lewis 1982, 1983 1985; Power 1975a, 1975b; Selby Smith, 1978).

Even at the very broad level of ASCO Major Group, the 1986 Census data demonstrates a clear substantial difference between the occupational distributions of women and men.

The most notable difference is in the proportion of women compared to men in Major Group 4 Tradespersons; the proportion of men employed as tradespersons is over six times the proportion of women. A higher proportion of men than of women are found in Major Groups 7 (Plant and Machine Operators, and Drivers) and 1 (Managers and Administrators). The often noted concentration of women in the less skilled white collar sector is reproduced here: women are over-represented in Major Group 5, Clerks, in particular, and also in Major Group 6, Sales and Personal Service Workers (see Eccles, 1982). Near equality in the proportions of men and women occurs for Professionals, Para-professionals and Labourers (probably due to cleaners and housekeepers, from this major group, being predominantly women).

TABLE 1. OCCUPATION BY SEX

Occupation	Males (%)	Females (%)	Ratio (M:F)
Managers	14.47	7.42	1.95
Professionals	11.70	12.00	0.98
Para-professionals	6.10	7.04	0.87
Tradespersons	22.79	3.76	6.06
Clerks	7.42	31.99	0.23
Salespersons and personal service workers	8.04	19.18	0.42
Plant and machine operators, and drivers	11.37	3.34	3.40
Labourers and related workers	15.36	12.85	1.20
Missing	2.75	2.41	
Total number	**100.00**	**100.00**	

Various indexes of segregation have been proposed, each with different advantages and disadvantages (See also Beller, 1984; Blau and Hendricks, 1979; England, 1981). The first of these is the Duncan-Duncan index, which measures the proportion of males or females required to shift occupational categories to achieve equal occupational distributions. It has the disadvantage of not taking into account the overall occupational distribution. The Moir-Selby Smith index attempts to compensate for this weakness by measuring the proportion of the female workforce which is required to change occupational categories in order to achieve an occupational distribution equivalent to that of the total workforce. It implies that an equal number (not proportion) of males will also have to shift to compensate for this hypothetical movement of females in order to preserve the overall occupational distribution. (Moir and Selby Smith, 1979). As noted by Lewis (1982), an analogous index in terms of males can be constructed. There is no clear reason for preferring an index based on the adjustment that has to be made to the female occupational pattern to one based on the changes that would have to be made to the male occupational pattern. Moreover, the two indexes will not be equal as long as there are there are unequal numbers of men and women in the workforce and the two indexes could move in opposite directions. It should be noted that the two "Moir-Selby Smith" indexes represent decomposition of the overall Duncan-Duncan index into a female and male component. (Lewis, 1982) To overcome the deficiencies in these indexes, Karmel and Maclachlan (1988) proposed a new index which measures the proportion of persons, irrespective of sex, required to change occupational categories to achieve an equal male and female occupational distribution without affecting the overall occupational distribution. For the above table the values of these indexes are:

Duncan-Duncan = 0.378
Moir-Selby Smith (fem) = 0.229
Moir-Selby Smith (male) = 0.149
Karmel-Maclachlan = 0.180

Taken together, these indexes demonstrate a considerable degree of occupational segregation by sex. Some 38 per cent of the female or male workforce would have to change major occupational groups before the sex based occupational distributions were equal. Taking the

assumption that the overall occupational structure remains fixed, some 23 per cent of females would have to shift occupations in order for the female occupational distribution to equal that of the total workforce; however, only 15 per cent of the male workforce would have to shift in order for the male occupational distribution to equal that of the total. Overall some 18 per cent of the workforce would have to shift occupational categories in order for there to be equality in the proportions of men and women in each occupational category within the existing total occupational distribution. All these figures are somewhat lower than those previously obtained using Census or Labour Force Household Survey data (Eccles 1982; Karmel and Maclachlan 1988; Lewis 1982, 1983 1985; Power 1975a, 1975b; Selby Smith 1978). However given the sensitivity of the measure to the number of occupational categories employed (Beller 1984; England, 1981; Lewis 1982) and given the fundamental shift in the nature of the occupational classification used after 1986 (Vaughan and Starrs 1987; Starrs and Vaughan 1988a, 1988b), no particular significance should be attached to this fact.

The difference in the occupational distribution between men and women was subjected to a chi squared analysis, using data standardized to total table percentages to compensate for the large numbers in the table. The results of this analysis add to the overall impression of the significance of this difference. The difference between the occupational distribution of men and women is highly significant (chi squared = 19.99, p = 0.005); sex is strongly associated with occupation at the Major Group level (Cramer's V = 0.45).

5. Previous studies and theoretical writings

Although the pronounced difference between the occupation distribution of women compared to men has often been remarked upon and used as evidence of gender based inequalities, there have been few empirical studies of the possible reasons for this difference in Australia. In her review of the literature on women and the labour force process, Eccles (1982: 331) signals this as a key area for further research and identifies the crucial factors which have to be considered in any such research:

> A third area warranting further research is the relative significance of the various factors that serve to maintain a high level of occupational segregation of the sexes. As the average educational level and labour market involvement of women now more closely approximates that of men, why has there been little change in segregation?

Sams (1984: 87-88), after a review of the literature on occupational segregation as it applied to Australia, made a similar appeal:

> In particular, it is suggested that the identification of contributions to segregation arising from differing levels of educational attainment, workforce experience, labour force attachment and other labour-relevant characteristics would improve our understanding of the

reasons for segregation and assist in the selection of the appropriate policy response.

This current study is an attempt to fulfil that need.

Miller and Volker (1985a) replicated a study by Brown et al.(1980) in the United States. Using data from the Social Mobility in Australia study 1973, they found a high level of dissimilarity between the male and female occupation distributions and considerable variation, depending on the method of analysis, in the extent to which this dissimilarity could be accounted for by labour market endowments. The multinomial logit method of analysis, which ignores the ordering of occupational categories, indicated that 41% of the variation in occupational attainment could be accounted for by labour market endowments, including family background variables. The ordered probit method of analysis, which utilizes the order of the dependent variable's categories, yielded two different estimates of variation explained by labour market endowments; namely, 34% when occupations were ordered by income and 10% when ordered by status. These variations in the explanatory power of labour market endowments are, as Miller and Volker state, the result of the different methods of analysis employed. However, they may also be interpreted as indicating more substantial differences. The initial figure of 41%, yielded by analysing the differences in the unordered occupational distributions, may be considered a bench mark figure of overall variation explained by labour market endowments. However, the fact that occupation is measured by the CCLO classification which employs cross cutting principles of aggregation makes substantive interpretation of this figure difficult. The next two results using the ordered probit method are capable of more meaningful interpretation; namely, the fact, that more men than women are in higher income-earning and more prestigious occupations, is based less on differences in labour market endowments than on other factors. Furthermore, labour market endowments are more important for explaining why a greater proportion of men than women attain higher income yielding occupations, than they are for explaining why a greater proportion of men attain more prestigious occupations.

In his examination of occupational segregation using 1981 census data, Lewis (1985) found that segregation varied with the level of education. It was particularly well above average among those with trade and other certificates and dropped successively with higher levels of education; segregation among those with no qualifications was moderate. Segregation also varied with marital status, being higher among those never married.

While empirical research into the factors that favour occupational segregation has been sparse, there has been a plethora of relevant theoretical writings, by overseas and Australian authors (for summary discussions, see O'Donnell 1984; Sams 1984; Williams and Lucas 1989). As discussed in the Introduction to this paper, the theoretical explanations of segregation may be divided into those which see segregation as emerging from the achieved characteristics of people (human capital theory,

in particular) and those which see it as emerging from the ascribed characteristics of men and women (discrimination, dual and segmented labour market theories, reserve army of labour thesis derived from Marxism and patriarchy).

The basic assumption of human capital theory is that, during the course of life, the individual maximizes personal utility subject to resource constraints and consequently optimizes decisions about participating in the labour market, choosing occupations and investing in education and training. Occupational segregation by gender results from differences in the optimizing calculus for men and women. Because women as a group tend to place high value on domestic responsibilities as wives, homemakers and child-raisers, it is optimal for them to invest less of their time in education and training and to seek employment in areas where earnings power is not substantially eroded when labour force participation is intermittant. Thus, segregation results from the systematic voluntary choices by women (Becker 1975: 101; Lloyd and Niemi 1979: 85-147; Mincer and Polachek 1974; Polachek 1979). However, empirical evidence from studies in the United States suggests that this thesis is flawed. Zellner (1975) found that the necessary labour supply hypothesis, that women enter more female dominated occupations intending to supply less time to labour participation than those entering male dominated occupations, was not justified by the evidence. After reviewing a wide range of evidence, Blau (1984) concluded that the human capital theory is not supported by the evidence (see also England 1982). What is suggested here is that there is a chain of causation linking the domestic roles of women to their labour market endowments and hence to their occupational attainment. Thus, I propose the human capital hypothesis: the relationship between sex and occupation will be largely produced by factors relating to the domestic roles of women as wives, homemakers and childraisers, operating through consequential differences in labour market endowment characteristics.

Within the sociological tradition (Broom and Jones 1976), status attainment research suggests that the differences between men and women in occupational attainment will be due to differences in socio-economic background, personal attributes and achieved characteristics, relevant to job performance, such as education. The difference in the occupational distributions of men and women may result from differences in relevant labour market endowments, however these are brought about. Thus, I propose the status attainment hypothesis: the relationship between sex and occupation will be a product of sex based differences in labour market endowments.

As discussed by O'Donnell (1984), dissatisfaction with the empirical basis for the human capital explanation resulted in the introduction of discrimination as an additional explanatory factor. Overt direct discrimination can occur at a number of levels: by employers, who will not hire women for certain jobs, even though they may be well qualified, by male workers, who may refuse to work with, or under the direction of, women, or who may

render the working situation impossible, or by customers, who may prefer to be served by male employees (Ferber and Lowry 1975-6). Indirect discrimination through socialised role differentiation may also affect labour market participation and the choice of occupation (Fuchs 1974). Discrimination may also be institutionalized through, for example, sex based job classifications, enterprise policies (for example, requiring women to retire on marriage) and the absence of appropriate support structures for female employment (Curthoys 1979; Power 1975a). For discrimination to result in occupational segregation, it has to be systematic, although not necessarily institutionalized. Systematic discrimination requires the widespread acceptance of supporting belief systems about appropriate social roles and behaviours for women and men. Hence, discrimination can be considered a partial explanation of occupational segregation, and must be considered within the wider social context. Discrimination is difficult to assess directly and has generally been assessed by considering any residual effect after accounting for the effect of relevant variables as the product of discrimination (Brown et al. 1980; Miller and Volker 1985a). However, it must be recognized that this approach is not entirely satisfactory, since it is unlikely that all other relevant factors will be accounted for first. While other methods for assessing discrimination more directly are available (see Kuhn 1987; Riach and Rich 1987), they do not enable the assessment of the importance of discrimination compared to other factors. For the moment, the residual method of assessing discrimination must suffice. Accordingly, I propose the discrimination hypothesis: that, after all relevant factors are taken into account, there will continue to be significant differences in occupational attainment by sex.

Explanations for occupational segregation by sex based on dual or segmented labour market theories or on the Marxist notion of a reserve army of labour have in common that they focus on demand factors rather than on supply factors such as the kinds of workers available. They differ primarily in terms of the types of labour market divisions identified. Within the theories identified as dual labour market theories, the characteristic division is said to be between central and peripheral, internal and external, primary and secondary labour markets. Segmented labour market theory emphasises that the labour market consists of many separate groups of workers, rather than two major groups, however characterized. By comparison, the Marxist notion of a reserve army of workers holds that there exists a group of workers who are only brought into the labour market at specific times of economic need. In each case it is argued that there exists a group or groups of workers who are forced to accept jobs with lower pay, poorer working conditions, and less job security (See O'Donnell 1984 for a summary account).

In each case, it is argued that these divisions are brought about as a result of the interests of employers in maximizing profits through keeping the cost of labour low, maintaining a stable skilled workforce and in preventing the development of unity among workers. Additionally, it is in the interests of those workers occupying relatively privileged positions within the workforce to maintain this inequality. In the dual labour market theories, workers in central, internal or primary labour markets have a stronger bargaining position than workers in peripheral, external or secondary labour markets, and so are more able to maintain their privileged position. By extension, privileged workers in segmented labour markets would be similarly placed. Those workers confined to the reserve army of labour, with intermittent labour force participation have little capacity for organization and virtually no bargaining power with employers.

The primary difficulty with these theories, when applied to the question of sex based occupational segregation, is that they fail to account for the primary facts of sex segregation and to explain why inequalities in occupational attainment are ordered by sex. As O'Donnell (1984) points out, the claim that women workers form a secondary or a peripheral labour market or an industrial reserve army is too simplistic an explanation which does not take into account that significant proportions of women are employed in primary occupations and are located in the main labour market. They also fail to account for the sex typing of occupations (Power 1975a). Nevertheless, these theories are important for a complete explanation of occupational segregation in that they draw attention to the importance of the dynamic power relationships between employers and groups of workers in affecting the labour market and the occupational structure and hence occupational attainment.

Indeed, their importance is only apparent when they are linked to some analysis of the position of women in the wider social context. Power (1975a) for example, combines the idea of a segmented labour market with socially based sex norms, manifested through overt and institutionalized discrimination to account for the sex typing of occupations and hence the occupational segregation of women. Similarly, Oppenheim-Mason (1984) incorporates the specific mechanisms derived from dual and segmented labour market theories with the ideology of gender to develop an explanation as to why women are confined to certain occupations, often with lower pay, status and poorer working conditions (See also Strober 1984). As Williams and Lucas (1989) point out in their review of recent case studies and theoretical writings, the work place may not be merely reproducing the sexual division of labour found in the family, but may be an active source in maintaining patriarchal relationships.

While it is difficult to develop an empirical test of the theories of dual labour market, segmented labour markets, reserve army of labour and patriarchy with the data available for this study, I propose two hypotheses relating to these theories. The first, labelled the divided market hypothesis : that, after all relevant factors are taken into account, there will continue to be significant differences in occupational attainment by sex. It should be noted that this is identical to the discrimination hypothesis. Because this study is concerned only with supply side factors in the labour market equation, it is unable to distinguish

between variations in demand and selection caused by systematic discrimination on the one hand and market driven behaviour by employers and employees on the other. However, it is able to identify the empirical consequences of these two sources of differential treatment, through the residual approach. The second hypothesis is based on the importance attached to gender role differentiation and the ideology of gender in explanations linked to patriarchy, such as those by Power (1975a) Oppenheim-Mason (1984) and Strober (1984) discussed above. To the extent that prevailing norms regarding gender based social roles are a factor in affecting the occupational attainment of women, then women who fulfil traditional domestic roles, as wives and mothers, are likely to attain less skilled jobs, regardless of their labour market endowments. Accordingly, I propose the ideology of gender hypothesis: that gender based differences in occupation will be produced by differences in factors relating to the domestic responsibilities of women, even after relevant labour market endowments are considered.

6. Summary of hypotheses

The relationship between sex and occupation will be the product of either:

(i) factors relating to domestic responsibilities of women, operating through consequential differences in labour market endowments (the human capital hypothesis); or

(ii) sex based differences in labour market endowments, operating independently from domestic responsibilities (the status attainment hypothesis); or

(iii) differences in factors relating to women's domestic responsibilities operating independently from labour market endowments (the ideology of gender hypothesis); or

(iv) factors other than either labour market endowments or those related to domestic responsibilities (the discrimination and the divided market hypotheses).

7. Independent variables

As discussed above, this study is constrained by the fact that it is a secondary analysis of Census data. However, it is possible to measure two sets of variables relating to the hypotheses proposed above. The first set consists of those variables concerning labour market endowments, namely years of education and years of labour market experience, already discussed in the Introduction. The second set consists of those variables relating to the domestic situation and responsibilities of women, namely, marital status, responsibility for children and the age of the youngest child.

Overall, the educational levels of men and women are very similar (Table 2); the average years of education for both groups is approximately 11 years, and similar proportions of men and women are found at the higher and lower levels of the scale. However, a significantly greater proportion of men have 13 years of education

(22%) compared to women (2%) and a somewhat greater proportion of women compared to men have undertaken 12 years of education compared to men.

TABLE 2. YEARS OF EDUCATION BY SEX
(Percentage)

Years of education	Males	Females
14+	12.64	13.32
13	21.79	2.32
12	24.34	33.49
11	13.44	18.37
10	15.54	21.17
<10	12.26	11.32
Total	**100.01**	**100.00**
Total number	**3,762,683**	**2,452,522**
Mean	11.66	11.34

Women have on average somewhat less labour market experience than men (a mean of 16 years compared to 20 years for men) (Table 3). The difference is particularly pronounced at the higher levels of labour market experience with only 6 per cent of females compared to 17 per cent of males having 35 or more years of potential labour market experience.

TABLE 3. LABOUR MARKET EXPERIENCE BY SEX
(Percentage)

Years	Males	Females
35 and over	17.22	6.30
25 – 34	17.84	13.94
15 – 24	25.32	26.48
5 – 14	28.47	38.66
0 – 4	11.15	14.63
Total	**100.00**	**100.00**
Total number	**3,762,683**	**2,262,932**
Mean	19.93	15.73

The second set of independent variables concerns the family situation - marital status, responsibility for children and the age of the youngest child. Marital status is measured by a three category variable - never married; currently married; previously married. There is little difference between males and females in terms of their marital status; there is a slightly higher proportion of females who have been married previously and a slightly lower proportion who are currently married (Table 4).

TABLE 4. MARITAL STATUS BY SEX
(Percentage)

Married	Males	Females
Never	29.46	31.21
Now	63.33	58.74
Previously	7.21	10.05
Total	**100.00**	**100.00**
Total number	**3,951,904**	**2,561,611**

Responsibility for children was measured by a two category variable, indicating that the person had or did not have dependent children present in the family household. A slight majority of men in the workforce are responsible for children and a slight majority of women do not have responsibilities for children (Table 5). This presumably reflects the underrepresentation of women with responsibilities for children in the labour force generally. The age of the youngest dependent child was categorized into pre-school (0-4 years), school (5-15), post-school (over 15). Compared to males with dependent children, females with similar responsibilites are less likely to have pre-school age children and more likely to have school age and post-school age children (Table 5). Again, this reflects the underrepresentation of women with responsibilities for younger children in the labour force. Family responsibilities appear to constrain the workforce participation of women, rather than men (Eccles 1982).

TABLE 5. DEPENDENT CHILDREN BY SEX
(Percentage)

Children	Males		Females	
	All	*With Chil-dren Only*	*All*	*With Chil-dren Only*
Age				
Pre-school	21.04	36.74	12.19	25.98
School	27.43	47.91	25.80	55.01
Post school	7.88	13.77	8.18	17.43
Missing	0.90	1.58	0.74	1.57
Sub-total children	*57.25*	*100.00*	*46.91*	*100.00*
No children	42.75		53.09	
Total	**100.00**		**100.00**	
Total number	3,317,491	1,899,268	2,561,611	1,201,705

8. Statistical analysis

The specific hypotheses proposed above need to be reformulated in terms of these specific variables and in terms which would enable statistical analysis.

The status attainment hypothesis (the relationship between sex and occupation will be a product of gender based differences in labour market endowments) implies the following conditions: the relationship between sex and occupation will cease to be significant once controlled for the influence of years of education and labour market experience; and family situation variables will not affect the relationship between gender and occupation.

The human capital hypothesis (the relationship between sex and occupation will be largely produced by factors relating to the domestic roles of women as wives, homemakers and child-raisers, operating through consequential differences in labour market endowment factors) implies the following statistical consequences: 1. among women only, family situation variables will be associated with less education and fewer years of labour market experience and consequently with lower occupational attainment; 2. the association between sex and occupation will cease to be significant when controlled for labour market endowments; 3. (assuming condition 1 holds), the association between sex and

occupation will cease to be significant when controlled for the interaction between sex and family situation variables; and 4. (assuming condition 3 holds) the relationship between the sex-family interaction term and occupation will cease to be significant when controlled for labour market endowments.

The discrimination and divided market hypotheses (after all relevant factors are taken into account, there will continue to be significant differences in occupational attainment by sex) implies that after controlling for labour market endowments, sex will be significantly associated with occupation.

The ideology of gender hypothesis (sex based differences in occupation will be produced by differences in factors relating to the domestic responsibilities of women, even after relevant labour market endowments are considered) implies the following statistical consequences: 1. among women only, family situation variables will be associated with occupational attainment, 2. (assuming that condition 1 holds) the association between sex and occupation will cease to be significant when controlled for the interaction between sex and family situation variables; and 3. (assuming that condition 2 holds) the relationship between the sex-family interaction term and occupation will continue to be significant when controlled for labour market endowments.

The human capital and the ideology of gender hypotheses are distinguished from the others in that they imply that among women only the family situation variables will be significantly related to occupational attainment. This, however, proves not to be the case, based on the chi squared test for association with data standardized to total table percentages to compensate for the large size of the raw data. Occupation does not vary significantly with marital status, either overall, or among men or among women. Neither the presence or absence of dependent children nor the age of the youngest dependent child has any effect on occupational attainment, overall, among men, or among women (Table 6). Since the remaining statistical conditions implied by the Human Capital Theory and Ideology of Gender hypotheses were dependent on this basic relationship being confirmed, there is no need to test specifically for the remaining conditions.

TABLE 6. CROSS-TABULATION ANALYSIS:
OCCUPATION BY FAMILY SITUATION VARIABLES

Variable	Chi Sqd	P	Df	Cramer's V
Marital status				
Males	4.39	n.s.	14	0.15
Females	3.73	n.s.	14	0.14
Total	**3.29**	**n.s.**	**14**	**0.13**
Children				
Males	0.38	n.s.	7	0.06
Females	0.53	n.s.	7	0.07
Total	**0.55**	**n.s.**	**7**	**0.07**
Age of youngest child				
Males	0.72	n.s.	21	0.05
Females	1.03	n.s.	21	0.06
Total	**0.72**	**n.s.**	**21**	**0.05**

The status attainment and discrimination or divided market hypotheses are distinguished by their predictions concerning the relationship between sex and occupation once labour market endowments (years of education and years of labour market experience) are taken into consideration. The results of controlling the relationship between sex and occupation for education and labour market experience are reported below (Table 7).

TABLE 7. CROSS-TABULATION ANALYSIS: OCCUPATION BY SEX CONTROLLED FOR YEARS OF EDUCATION

Education category (years)	Chi Sqd	P (df=7)	Cramer's V
Less than 10	14.85	0.025	0.39
10	23.45	0.005	0.49
11	24.19	0.005	0.49
12	16.37	0.025	0.40
13	4.01	n.s	0.20
14 or more	4.28	n.s	0.21

Comparing the figures reported in Table 7 for each level of education with the overall relationship between sex and occupation (chi squared = 19.99; p = 0.005 with 7 degrees of freedom; Cramer's V = 0.45) shows that, with the exception of those with less than ten years of education, the differences in the occupational distribution of males and females is reduced with years of education. The effect is most marked among those with thirteen or more years of education, i.e. those with a trade or other post school certificate, undergraduate diploma, degree or postgraduate qualification.

TABLE 8. CROSS-TABULATION ANALYSIS: OCCUPATION BY SEX CONTROLLED FOR LABOUR MARKET EXPERIENCE

Experience category (years)	Chi Sqd	P (DF=7)	Cramer's V
0 to 4	28.77	0.0005	0.54
5 to 14	21.83	0.005	0.47
15 to 24	18.24	0.01	0.43
25 to 34	17.34	0.01	0.42
35 +	10.62	n.s.	0.33

Controlling for the relationship between occupation and sex for years of labour market experience shows a reduction in the relationship between sex and occupation with increasing years of labour market experience (Table 8). However it is only among those with a great deal of labour market experience (thirty five years or more) that the differences between the sexes becomes insignificant.

Before dealing with the multivariate analysis which looks at the combined effect of these two variables on the relationship between occupation and sex, it is necessary to analyse the effects of the family situation variables on the sex-occupation relationship. The second statistical implication of the status attainment hypothesis is that family situation variables will have no effect on the relationship between occupation and sex. The discrimination or divided market hypothesis makes no prediction about this relationship.

TABLE 9. CROSS-TABULATION ANALYSIS: OCCUPATION BY SEX CONTROLLED FOR FAMILY SITUATION VARIABLES

Variable	Chi Sqd	P (df=7)	Cramer's V
Marital status			
Never married	24.86	0.0005	0.49
Previously	21.35	0.005	0.46
Married	18.67	0.005	0.43
Children			
No children	21.75	0.005	0.47
Children	20.39	0.005	0.45
Age of youngest child			
Pre-school	18.54	0.005	0.43
School	21.03	0.005	0.46
Post-school	19.82	0.005	0.45

Controlling for family situation variables makes no difference to the relationship between gender and occupation (Table 9). The slightly greater association among those never married may well result from the younger age of the never married, who would consequently have lower labour market experience.

TABLE 10. CROSS-TABULATION ANALYSIS: OCCUPATION BY SEX CONTROLLED FOR MARITAL STATUS AND THE AGE OF THE YOUNGEST CHILD

Marital status	Age of youngest child	Chi Sqd	P	Cramer's V
Never married	0 to 4	30.80	0.005	0.55
	5 to 15	31.58	0.005	0.56
	15 and over	24.46	0.005	0.51
	No children	33.31	0.005	0.48
Previously married	0 to 4	28.54	0.005	0.53
	5 to 15	24.42	0.005	0.49
	15 and over	21.61	0.005	0.46
	No children	19.50	0.005	0.44
Now married	0 to 4	17.48	0.01	0.42
	5 to 15	19.48	0.005	0.45
	15 and over	18.14	0.01	0.43
	No children	18.70	0.005	0.43

It is possible that it is the combination of marital status and responsibilities for children, rather than either factor singly, which is important for the occupational attainment of women. To test this possibility, the relationship between sex and occupation was controlled for marital status and the age of the youngest child simultaneously. These data are presented in Table 10 and indicate that family situation factors do not individually or collectively reduce the relationship between occupation and sex. All chi squareds in the above table are significant at the 0.01 level at least and all measures of association are compatible with that found overall (V = 0.45).

While it has been found that sex is strongly related to occupational attainment and that this relationship decreases in strength with higher levels of education and more years of labour market experience, the analyses conducted thus far do not permit any generalization as to the overall effect of years of education and labour market experience on the relationship. To examine the overall effect, the data were subjected to multivariate analysis

employing the logistic regression technique (Appendix C). The logistic regression model employed in the analysis used forced stepwise inclusion to add the variables in the following order: sex, years of education and years of labour market experience. The forced stepwise solution was chosen specifically to examine how the relationship between sex and occupation was affected firstly by education, which had been shown to have a greater effect on the relationship than labour market experience, and secondly, by the combined effect of education and labour market experience. The primary results from this analysis are reported below in Table 11.

TABLE 11. LOGISTIC REGRESSION:
GENDER AND OCCUPATION

Variables in model:	Sex	Sex education	Sex education experience
Model R	0.041	0.208	0.220
Sex beta	0.299	0.120	0.010
Sex R	0.041	0.017	0.001
Education beta	.....	0.503	0.550
Education R	.....	0.200	0.211
Experience beta	.....	.....	0.227
Experience R	.....	.....	0.073

Consider first the model R statistic. This measures the predictive ability of the model and is similar to the multiple correlation coefficient. It takes on the value 0 if the model is of no value and 1 if the model predicts perfectly. R squared is the proportion of log likelihood explained by the model. None of the three models tested here has a high predictive value; the best being the model containing all three variables which explains 4.84 per cent of the log likelihood. Most of the model's capacity to predict occupation derives from the inclusion of years of education and only marginally from years of labour market experience. In short, other untested factors need to be examined in order to improve the predictability of occupation.

In the uncontrolled situation, sex has a moderately high beta value, which is reduced by over half with the introduction of education into the model and which is further reduced to nearly zero with the addition of years of labour market experience. As suggested by the three way crosstabulation analysis earlier, the differences between the occupational distributions of the sexes is largely a product of sex differences in years of education and, secondly, of the differences in length of labour market experience. There is no evidence of a significant residual sex effect which would support the hypotheses of systematic discrimination or the forces of divided labour markets.

9. Conclusion

The evidence reported here taken together provides overwhelming support for the status attainment hypothesis, that differences in the occupational distributions of men and women result from sex based differences in years of education and labour market

experience. There is no evidence to support the human capital hypothesis that these differences in occupational attainment are linked to family situation variables via labour market endowments; that women choose to invest less of their time in education and the labour market in order to assume domestic responsibilities as wives, homemakers and child-raisers and thus attain less skilled jobs. There is also no evidence for the ideology of gender hypothesis that women attain less skilled jobs because of traditional sex role differentiation.

The import of these conclusions needs to be tempered by three observations. First, while this study demonstrates that sex differences in occupational distributions ordered by ASCO Major Groups are the result of sex based differences in education and labour market experience, it does not make any conclusions about sex differences within Major Groups. What is being explained here is the fact that there are fewer female Managers and Administrators, Tradespersons, and Plant and Machine Operators and Drivers, and more female Clerks, Sales and Personal Service Workers than men. As Power (1975a) observed in a different context, the broadness of the Census categories may conceal more gender concentration and segregation. At the Major Group level there is no large difference between the proportions of men and women in Professional and Para-professional occupations, but each of these groups contains an occupation in which women have long been concentrated, namely teachers and nurses respectively. Not only may the extent of segregation be greater below Major Group level, but also the sex typing of occupations may be a more important factor, since the occupations are grouped according to skill specialization criteria. Skill specialization criteria consist of the field of knowledge, the tools and equipment used, the materials worked on and the goods or services produced. If, as Power (1975b) notes, many of the occupations in which women are segregated are characterized by tasks which are similar to housework and nurturing, then segregation is likely to be more observable when occupations are grouped by skill specialization than by skill level.

Second, the Major Group level of ASCO orders groups of occupations by broad ranges of skill level, not by any other criterion such as status or prestige, earning capacity, power or position in the processes of production, distribution and exchange. While these various dimensions of occupations are likely to be related, the nature and extent of these relationships is not necessarily one-to-one; this is particularly so because of the broadness of the measure of skill level. What is being said here is that, in terms of this single dimension of occupation, skill level, the differences between the distribution of women and men can be accounted for by sex based differences in education and labour market experience. It would be folly to make any such claim about the comparative distribution of men and women in terms of income, status, power or class. Indeed, the findings of Miller and Volker (1985a) reported earlier suggest that different factors may be more or less important in explaining different dimensions of occupational attainment. Their analysis indicated that labour market endowments were more important in

explaining why more men than women attained higher income yielding occupations than in explaining why more men than women attained higher status occupations. That labour market endowments effectively account for the sex differences in the skill distribution of occupations, does not lead to the conclusion that this would hold for other dimensions of occupations.

The third qualification to the import of these conclusions is based on the specifics of the explanatory factors. The differences in the occupational distributions may be explained by the differences between men and women in their years of education and labour market experience. The difference in education, although expressed in years, would not appear to be one of average years of education, since both men and women have approximately 11 years of education. Rather it would appear to be one of the type of educational qualifications obtained which is reflected in the measure. Specifically, a smaller proportion of women have attained 13 years of education which is equivalent to

obtaining a trades qualification and a larger proportion of women have attained 12 years of education. This difference in the kind of education is likely to account for the tendency of women not to be employed as Tradespersons, but rather to be employed as Clerks. The explanation for differences in occupational attainment lies in those factors which induce women and men to undertake different educational paths; this may be due, for example, to the sex typing of occupations which renders certain educational paths to be seen as inappropriate for women, practices of exclusion and closure which make entry into certain educational paths difficult, or socialization to traditional sex roles. Similarly, the particular experiences which lower women's labour market experience need to be accounted for. In other words, the conclusion that the sex differences in the skill based occupational distribution is due to sex differences in educational and labour market experience raises the further question as to the origin of these sex based differences in education and labour market experience.

APPENDIX A

AUSTRALIAN STANDARD CLASSIFICATION OF OCCUPATIONS

ASCO is a hierarchic classification and is composed of four levels: Major Group, Minor Group, Unit Group and Occupation. At the Major Group level, groups are separated principally according to skill level; at the lower levels the skill specialisation criteria are applied in successively finer degrees of detail. Eight Major Groups are distinguished in the classification on the basis of skill level. In descending order of skill level, these are: 1 Managers and Administrators; 2 Professionals; 3 Para-professionals; 4 Tradespersons; 5 Clerks; 6 Salespersons and Personal Service Workers; 7 Plant and Machine Operators, and Drivers; 8 Labourers and Related Workers.

Major Group One, Managers and Administrators, includes occupations with the highest level of skill, commensurate with a three year degree and five to ten years of previous relevant work experience. Tasks performed in these occupations are broad ranging and complex and require good understanding of a range of matters and a high level of judgement: "Tasks performed by Managers and Administrators typically include formulating, administering and reviewing the policy and/or legislation which determine the direction to be taken by the body they head; controlling, directing and participating in the activities of that body personally or though a hierarchy of subordinate managers and supervisors; establishing operational and administrative procedures; and controlling the selection of senior staff and the allocation of resources." (Australian Bureau of Statistics, 1986: 65). In addition to legislators and government appointed officials, and general and specialist managers, this group includes farmers and farm managers, and managing supervisors who "head establishments too small to have a hierarchy of managers...[and who]...co-ordinate all functions of such establishments." (Australian Bureau of Statistics 1986: 75 and 78).

Professional occupations, which comprise Major Group Two, have a level of skill commensurate with a three year degree (or longer), but do not require the extensive previous work experience of occupations in Major Group One. It includes scientists, engineers, architects, medical practitioners, school teachers, various social and business professionals, artists and related occupations. People in these occupations "...perform analytical, conceptual and creative tasks requiring a high level of intellectual ability and thorough understanding of an extensive body of theoretical knowledge." (Australian Bureau of Statistics 1986: 79).

Para-professional occupations in Major Group Three, by contrast, consist of those occupations where people perform "...complex technical tasks requiring the understanding of a body of theoretical knowledge and significant practical skills" (Australian Bureau of Statistics, 1986: 109) and require a level of skill

commensurate with a two to 3 year certificate or associate diploma, and in many cases additional on-the-job training. It includes various technical officers and technicians (for example, laboratory technicians, civil engineering associates, air traffic controllers, ships' captains, and marine engineers), aircraft pilots, nurses (except enrolled nurses), police, ambulance officers and prison officers.

Major Group 4, Tradespersons, includes the recognized trade occupations with a level of skill characterized by a four year trade certificate, usually obtained by apprenticeship (Australian Bureau of Statistics 1986: 125).

By contrast, the occupations grouped together in Major Group 5, Clerks, have a slightly lower level of skill, commensurate with Years 11 and 12 at secondary school plus six months on-the-job training. It includes occupations such as stenographer, office secretary, typist, data entry operator, bookkeeper, filing clerk, stock clerk, receptionist, messenger and teachers' aide (Australian Bureau of Statistics 1986: 155-168).

Major Group Six, Salespersons and Personal Service Workers, comprises those occupations where the primary task is selling or providing a personal service. While most occupations in this group require a level of skill equivalent to Year Ten at secondary school plus three month on-the-job training, some (for example, securities and finance dealers, dental nurses) require higher qualifications. The group includes occupations such as real estate salespersons, sales representatives, sales assistants, bar attendants, waiters, kindergarten assistants and enrolled nurses (Australian Bureau of Statistics 1986: 169-180).

Major Group Seven, Plant and Machine Operators and Drivers, includes those occupations where the primary tasks concern the operation of vehicles or other large equipment. No formal education or previous experience is usually required, the necessary skill being acquired through on-the-job training ranging from 3-24 months. It includes drivers of buses, trams, cars, trucks, locomotives and forklifts, operators of excavating and earth-moving equipment, agricultural machinery, power generating plants, cranes, and production machinery (Australian Bureau of Statistics 1986: 181-200).

Major Group Eight, Labourers and Related Workers includes those occupations where the primary tasks are usually routine and carried out manually or with the assistance of hand tools and appliances. No formal qualifications or previous work experience is required, but some on-the-job training (up to 12 months) may be required. It includes trades assistants, farm hands, forestry labourers, cleaners, building and construction labourers, storemen/women, and kitchen hands (Australian Bureau of Statistics 1986: 201-216).

APPENDIX B

VARIABLE SPECIFICATIONS

Occupation

Occupation is measured by the Australian Standard Classification of Occupations (ASCO) at the Major Group Level. It is derived from the Census variable OCC.

Asco major group

1. Managers and Administrators
2. Professionals
3. Para-professionals
4. Tradespersons
5. Clerks
6. Salespersons and Personal Service Workers
7. Plant and Machine Operators and Drivers
8. Labourers and Related Workers

The interpretation of these groups is discussed fully in the Statistical Classification. (Australian Bureau of Statistics 1986)

Sex

This variable is the same as the Census variable SEX.

Years of education

Years of education is the level of education qualifications and schooling translated into typical years of full time education. The variable has the range 0 - 18 years. However no case has the values 1-6 or 17.

Qualification	Years
Higher degree	18
Graduate diploma	16
Bachelor degree	15
Diploma	14
Trade certificate	13
Other certificate	12
Not classifiable	0
Not recognized or inadequately described	0
No qualifications	0
Not stated	0

For those with no qualifications, that is 0 above, Years of Education equals *Age left school* - 5. Individuals with a stated school leaving age of 18 or more years are assigned 12 years of education.

This variable is derived from Census variables on age left school (ALS) and *Highest* qualification (QAL).

Labour market experience

Labour market experience is measured as years of potential experience in the labour market.

The Census does not include any direct measure of labour market experience or of the time spent in the current job, in vocational training, or out of the workforce. Hence, it is only possible to obtain a crude estimate of nett potential labour market experience, as opposed to actual workforce experience. It is, however, possible to discount women's labour market experience for the time probably lost through childbirth. Two formulae are used to estimate potential labour market experience:

1. For males: *Labour market experience = age – years education – 5*

2. For females: *Labour market experience = age - years education – 5 – (2* number of children born)*

Labour Market Experience is derived from the Census variables *Age* and *Total issue living* (TIS), and the constructed variable *Years of education.*

Marital status

This is measured by a three category variable: "Never Married"; "Married"; "Previously Married" (the Census categories "Separated, not divorced", "Divorced", "Widowed"). It is derived from recoding the Census variable MST.

Number of dependent children

The number of children who are dependent on the subject is measured by the Census variable, Total Number of Dependent Children (DPT), (Family level) which includes children normally resident in the household but temporarily absent on census night.

Age of youngest child

Age of the youngest dependent child is measured as "Pre-school" (0-4 years), "School" (5-15 years) and "Post School" (over 15 years) by recoding the Census variable, Age of the Youngest Dependent Child, (AGY).

APPENDIX C

LOGISTIC REGRESSION

Logistic multiple regression was chosen for this study because it offers the following advantages: (1) it is suitable for use with an ordinal dependent variable, such as occupation classified to the ASCO Major Group level, unlike ordinary least squares regression; (2) it preserves the order inherent in the dependent variable categories, unlike multinomial logit (see Miller and Volker 1985a); (3) it makes a clear distinction between dependent and independent variables, unlike log linear models; and (4) it was readily available under the SAS system used by the ABS.

In a logistic regression, the dependent variable is a logit, or the natural logarithm of the probability of being, in the case of an ordinal dependent variable such as occupational skill level groups, in a higher rather than a lower category. The probability (conditional on the vector of independent variables) of being in a higher group is given by the formula

$$P\ (Y_i = j) = 1/(1 + \exp(-A_j - X_i B))$$

where A is the intercept parameter, $j = 1, 2, \ldots k$ and the range of the dependent variable Y is $0, 1, 2, \ldots k$, and $X_i B$ denotes the vector of regression parameters for the ith observation (i.e. $X_i B = X_{i1} B + X_{i2} B + \ldots X_{in} B$).

As in ordinary least squares regression, variables with a negative Beta weight tend to reduce the chances of being in a higher group, while those with a positive sign tend to increase them. As the Beta weight approaches zero, the variable has less impact on the probability of being in a higher rather than lower group of the dependent variable.

While the relative effect of any one variable can be evaluated by considering the Beta weights, interpretation of the results can sometimes be difficult since the dependent variable in the regression equation is a logit of probabilities rather than a metric. It is useful to illustrate variable effects by considering the predicted probabilities derived from the logistic regression equation given above. This is simply done by inserting appropriate Beta weights, independent variable values and intercept parameters into the equation. Successive calculation of the probabilities for each intercept parameter yields cumulative probabilities from which probabilities for each category of the dependent variable can be obtained by subtraction; these can be expressed as percentages. Conventionally, these effects are evaluated at the mean for each of the dependent variables (Pedersen 1985), but it may be more useful to insert other values to illustrate particular effects.

The specific program in SAS used in this study was developed by Harrell (1980).

BIBLIOGRAPHY

Australian Bureau of Statistics (1986) *Australian Standard Classification of Occupations (First Edition) - Statistical Classification* Australian Bureau of Statistics, Canberra

Becker, G. (1975) *Human Capital - 2nd Edition* Columbia University Press, New York

Beller, A.H. (1984) "Trends in Occupational Segregation by Sex and Race, 1960-1981" in Reskin, B.F. (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies* National Academy Press, Washington: 11-26

Bennett, L. (1984) "The Construction of Skill: Craft Unions, Women Workers and the Conciliation and Arbitration Court" *Law in Context: A Socio-legal Journal* 2: 118-32

Blau, F.D. (1984) "Occupational Segregation and Labour Market Discrimination" in Reskin, B.F. (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies* National Academy Press, Washington: 117-139

Blau, F.D. and Hendricks, W.E. (1982) "Occupational Segregation by Sex: Trends and Prospects" *Journal of Human Resources* 14: 197-201

Broom, L. and Jones, F.L. (1976) *Opportunities and Attainment in Australia* National University Press Canberra

Brown, S., Moon, M. and Zoloth, B.S. (1980) "Occupational Attainment and Segregation by Sex" *Industrial and Labour Relations Review* 33(4): 506-517

Chiswick, B.R. and Miller, P.W.(1985) "Immigrant Generation and Income in Australia" *The Economic Record* 61: 540-553

Cockburn, C. (1983) *Brothers; Male Dominance and Technological Change* Pluto, London

Collins, J. (1975) "Political Economy of Post-War Immigration" in E. Wheelwright and K. Buckley (eds.), *Essays in the Political Economy of Australian Capitalism Vol 1*, Sydney ANZ Publishing: 105-129

Curtain, R. (1987) "Skill Formation and the Enterprise" *Labour and Industry* 1(1): 8-38

Curthoys, A. (1979) "Explaining the Sexual Division of Labour Under Capitalism" *Refractory Girl* December

Doeringer, P. and Piore, M.J. (1971) *Internal Labour Markets and Manpower Analysis* Lewington, Massachusetts: Heath

Duncan O.D. and Duncan B. (1955a) "A Methodological Analysis of Segregation Indexes" *American Sociological Review* : 210-17

Duncan O.D. and Duncan B. (1955b) "Residential Distribution and Occupational Stratification" *American Journal of Sociology* : 493-503

Eccles, S. (1982) "The Role of Women in the Australian Labour Market: A Survey of the Literature" *Journal of Industrial Relations* 24: 315-336

England, P. (1981) "Assessing Trends in Occupational Segregation 1900-1976" in I. Berg (ed), *Social Perspectives on Labour Markets* Academic Press, New York: 273-295

England, P. (1982) "The Failure of Human Capital Theory to Explain Occupational Sex Segregation" *Journal of Human Resources* 17: 358-370

Evans, M.D.R. (1984) "Immigrant Women in Australia: Resources, Family and Work" *International Migration Review* 18(4): 1063-1090

Ferber M. and Lowry, H. (1975-6) "The Sex Differential in Earnings: A Reappraisal" *Industrial and Labour Relations Review* 29: 376-387

Fuchs, V. (1974) "Women's Earnings: Recent Trends and Long Run Prospects" *Monthly Labour Review* 97 (5 May): 23

Gilmour, P. and Landsbury, R. (1978) *Ticket to Nowhere: Education, Training and Work in Australia* Ringwood, Vic., Penguin Books

Granovetter, M (1981) "Toward a Sociological Theory of Income Differences" in I. Berg (ed), *Sociological Perspectives on Labour Markets* New York, Academic Press: 11-47

Griffin, T. (1983) "Technological Change and Craft Control in the Newspaper Industry: An International Comparison" *Cambridge Journal of Economy* 8(1): 41-46

Griffin, L. and Kalleberg, A. (1981) "Stratification and Meritocracy in the United States: Class and Occupational Recruitment Patterns" *British Journal of Sociology* 32(1): 1-38

Harrell, F. (1980) "The Logist Procedure" *SAS Supplemental Library* Raleigh, N.C., SAS Institute: 83-102

Karmel, T. and Maclachlan, M. (1988) "Occupational Sex Segregation - Increasing or Decreasing?" *The Economic Record* 64 (186): 187-195

Kuhn, P. (1987) "Sex Discrimination in Labour Markets: The Role of Statistical Evidence" *American Economic Review* 77(4): 567-583

Lever-Tracy, C. (1981) "Labour Market Segmentation and Diverging Migrant Incomes" *Australian and New Zealand Journal of Sociology* 17(2): 21-30

Lever-Tracy, C. and Tracy, N. (1988) "Gender Differences in Participation Rates and Hours of Work in the Paid Workforce: A Research Note" *Australian and New Zealand Journal of Sociology* 24(1): 124-135

Lewis, D.E. (1982) "The Measurement of the Occupational and Industrial Segregation of Women" *Journal of Industrial Relations* 24: 406-423

Lewis, D.E. (1983) "The Measurement and Interpretation of the Segregation of Women in the Workforce" *Journal of Industrial Relations* 25: 347-352

Lewis, D.E. (1985) "The Sources of Change in the Occupational Segregation of Women" *The Economic Record* 61: 719-736

Lloyd, C.B. and B.T. Niemi (1979) *The Economics of Sex Differentials* Columbia University Press, New York

Manderson, L. and Inglis, C. (1984) "Turkish Migration and Workforce Participation in Sydney, Australia" *International Migration Review* 18 (2): 258-275

Marini, M.M. and Brinton, M.C. (1984) "Sex Typing in Occupational Socialization" in Reskin, B.F. (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies* National Academy Press, Washington: 192-232

McDonnell, P., Jones, F.L. and Duncan-Jones, P. (1978) "Notes on the Australian Occupational Classification as a Social Science Research Tool" *Australian Journal of Statistics* 20 (2): 136-142

McGavin, P.A. (1983) "The Measurement of the Occupational and Industrial Segregation of Women: A Reappraisal" *Journal of Industrial Relations* 25: 339-346

Miller, P.W. (1987) "Aspects of Occupational Mobility and Attainment Among Immigrants in Australia" *International Migration Review* 21(1): 96-113

Miller, P.W. and Volker, P.A. (1985a) "On the Determination of Occupational Attainment and Mobility" *The Journal of Human Resources* 20(2): 197-213

Miller, P.W. and Volker, P.A. (1985b) "Economic Progress in Australia: An Analysis of Occupational Mobility" *The Economic Record* 61: 463-475

Mincer, J. and Polachek, S. (1974) "Family Investment in Human Capital: Earnings of Women" *Journal of Political Economy* 82(2): 76-108

Moir, H. and Selby Smith, J. (1979) "Industrial Segregation in the Australian Labour Market" *Journal of Industrial Relations* 21: 281-291

O'Donnell, C. (1984) "Major Theories of the Labour Market and Women's Place Within It" *Journal of Industrial Relations* 26: 147-165

O'Malley, P. (1978) "Australian Immigration and the Dirty Worker Syndrome" *The Immigration Issue in Australia* Bundoora, Victoria Department of Sociology, La Trobe University: 7-59

Oppenheim-Mason, K. (1984) "Commentary: Strober's Theory of Occupational Sex Segregation" in Reskin, B.F. (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies* National Academy Press, Washington: 157-170

Pedersen, T. (1985) "A Comment on Presenting Results from Logit and Probit Models" *American Sociological Review* 50: 130-1

Polachek, S.W. (1979) "Occupational Segregation among Women: Theory, Evidence and a Prognosis" in C.B. Lloyd, E.S. Andrews and C.L. Gilroy (eds), *Women in the Labour Market* New York, Columbia University Press: 137-157

Power, M. (1975a) "Women's Work is Never Done - by Men" *Journal of Industrial Relations* 17: 225-239

Power, M. (1975b) "The Making of a Women's Occupation" *Hecate* 1 July: 25-33

Riach, P.A. and Rich, J. (1987) "Testing for Sexual Discrimination in the Labour Market" *Australian Economic Papers* Monash University, Vicoria

Reskin, B.F. (1984) *Sex Segregation in the Workplace: Trends, Explanations, Remedies* National Academy Press, Washington

Sams, D. (1984) "Occupational and Industrial Segregation of Female Employment in Australia: A Review" in M.Hoy (ed), *Women in the Labour Force: The Proceedings of a Conference 12-13 August 1982* BLMR Monograph Series 4, AGPS, Canberra: 66-92

Selby Smith, J. (1978) "Changes in Employment by Occupation" *Journal of Industrial Relations* 20: 350-354

Selby Smith, J. (1984) "Comments" in M.Hoy (ed), *Women in the Labour Force: The Proceedings of a Conference 12-13 August 1982* BLMR Monograph Series 4, AGPS, Canberra: 93-103

Sorenson, A.B. and Kalleberg, A.L.(1981) "An Outline of a Theory of the Matching of Persons to Jobs" in I. Berg (ed), *Sociological Perspectives on Labour Markets* New York, Academic Press: 49-74

Starrs, C. and Vaughan, G. (1988a) "Rendering to Cesa" *The Australian Journal of Social Issues* 23: 231-5

Starrs, C. and Vaughan, G. (1988b) "Holton and Martin on Class and Occupation" *The Australian and New Zealand Journal of Sociology* 24: 285-8

Strober, M.H. (1984) "Toward a General Theory of Occupational Sex Segregation: The Case of Public School Teaching" in B.F. Reskin (ed) *Sex Segregation in the Workplace: Trends, Explanations, Remedies* National Academy Press, Washington: 144-156

Vaughan, G. and Starrs, C. (1987) "Recent Developments in Statistical Data on Occupation" *Paper presented at the 1987 Conference of the Sociological Association of Australia and New Zealand*

Vaughan, G. (1992) "Occasional Paper - Birthplace Differences in Occupational Attainment" *Australian Bureau of Statistics*, Commonwealth Government Printer, Canberra

Walker, J. (1981) "Markets, Industrial Processes and Class Struggle: The Evolution of the Labour Process in the U.K. Engineering Industry" *Review of Radical Political Economics* 12 (4): 45-56

Walker, J. (1987) "Skill and the Australian Standard Classification of Occupations" *National Economic Review* 7 June

Western, J.S. (1983) *Social Inequality in Australian Society* MacMillan, Melbourne

Wild, R.A (1974) *Social Stratification in Australia*, George Allen and Unwin, Sydney

Williams, C. and Lucas, J. (1989) "Gender and the Labour Process: A Review of the Literature" *Labour and Industry* 2 (1): 145-161

Zellner, H. (1975) "The Determinants of Occupational Segregation" in C.B. Lloyd (ed), *Sex Discrimination and the Division of Labour* Columbia University Press, New York

Australian Bureau of Statistics

For more information ...

The ABS publishes a wide range of information on Australia's economic and social conditions. A catalogue of publications and products is available from any of our Offices (see below for contact details).

Information Consultancy Service

Special tables or in-depth data investigations are provided by the ABS Information Consultancy Service in each of our Offices (see below for contact details).

Electronic Data Services

A growing range of our data is available on electronic media. Selections of the most frequently requested data are available, updated daily, on DISCOVERY (Key *656#). Our TELESTATS service delivers major economic indicator publications ready to download into your computer on the day of release. Our PC-AUSSTATS service enables on-line access to a data base of thousands of up-to-date time series. Selected datasets are also available on diskette or CD-ROM. For more details on our electronic data services, contact Information Services in any of our Offices on the numbers below.

Bookshops and Subscriptions

There are over 500 titles available from the ABS Bookshops in each of our Offices. You can also receive any of our publications on a regular basis. Join our subscription mailing service and have your publications mailed to you in Australia at no additional cost. Telephone our Publications Subscription Service toll free on 008 02 06 08 Australia wide.

Sales and Inquiries

☎

SYDNEY (02) 268 4611
MELBOURNE (03) 615 7000
BRISBANE (07) 222 6351
PERTH (09) 323 5140

ADELAIDE (08) 237 7100
HOBART (002) 20 5800
DARWIN (089) 43 2111
CANBERRA (06) 252 6627

✉

Information Services, ABS, PO Box 10, Belconnen ACT 2616
or any ABS State office.

2062830006865

Recommended retail price: $15.00